Automated Fault Plane and Polygon Generation in a Large, Mixed 2D and 3D Seismic Data Set

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Automated processes for generating spatially consistent fault planes are available in a 3D seismic interpretation environment - but not in 2D.

Automation of this process in a mixed 2D and 3D seismic environment was achieved by applying existing Landmark technology so that it became possible to simultaneously process some 450 assigned faults and 14 horizons interpreted on mixed 2D and 3D seismic data.

The maximum spatial extent of the 2D and 3D data sets was used to define a conventional 3D volume. Interpreted horizons were imported into the empty 3D volume from respective original projects regardless of their 2D or 3D origin. Horizon interpolation ensured seamless horizons between 2D and 3D data. Correlated and assigned fault segments were imported in an identical manner.

All interpretation data are thus defined by spatial coordinates in a common 3D data volume and can be processed using 3D applications.

All fault segments are ‘Re-Ribbed' in the 3D domain. ‘Re-Ribbing' is run in both x and y directions separately to account for faults sub-parallel to either ribbing direction. ‘Re-Ribbed' fault segments and seismic horizons are processed in ‘Surface Tool' to calculate fault heaves and polygons.

Fault polygons are generated for all selected horizons maintaining fault plane integrity and polygon consistency among horizons. Conventional gridding and contouring of interpreted horizons is performed incorporating fault polygons.

The method is an efficient tool that can be applied to any 2D / 2D-3D data for quick and accurate fault mapping across numerous horizons, without compromising fault plane integrity.